

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

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UNITED STATES OF AMERICA,

Plaintiff,

- against -

Civil Action

No. CV- 07-0835

AGI-VR/WESSON COMPANY;
ALLOY CARBIDE COMPANY;
CHI MEI CORPORATION;
CLIMAX MOLYBDENUM COMPANY;
CLIMAX MOLYBDENUM MARKETING
CORPORATION;
COUNTY OF NASSAU, NEW YORK;
CYPRUS AMAX MINERALS COMPANY;
GENERAL ELECTRIC COMPANY;
GTE CORPORATION;
H.C. STARCK, INC.;
KENNAMETAL INC.;
M & R INDUSTRIES, INC.;
MINMETALS INC.;
OSRAM SYLVANIA CORPORATION;
PHILIPS ELECTRONICS NORTH
AMERICA CORPORATION;
SANDVIK AB;
TDY HOLDINGS, LLC; and
TDY INDUSTRIES, INC.,

(Seybert, J.)
(Orenstein, Ch. M. J.)

Defendants.

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APPENDIX D PART 1 TO THE CONSENT JUDGMENT

FINAL REMEDIAL ACTION WORK PLAN

Remedial Action at Parcel B and Upper Parcel C of the Li Tungsten Property of the Li Tungsten Superfund Site

**Prepared at the Order of the
Environmental Protection Agency**

June 2006

**ECC
1746 Cole Blvd., Bldg. 21, Suite 350
Lakewood, Colorado 80401**



LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order on Consent
ASTM	American Society for Testing and Material
CCS	Confirmation and Characterization Surveys
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHP	Certified Health Physicist
CIH	Certified Industrial Hygienist
cpm	counts per minute
CQAPP	Contractor Quality Assurance Project Plan
CRZ	Contamination Reduction Zone
CS	Construction Superintendent
CY	Cubic Yard
DQCR	Daily Quality Control Report
DCGL_w	Derived Concentration Guideline Limits for a Wide Area
DOE	Department of Energy
DOT	Department of Transportation
dpm	disintegrations per minute
EPA	Environmental Protection Agency
ESD	Explanation of Significant Difference
EZ	Exclusion Zone
FRD	Final Remedial Design Report (URS)
FSS	Final Status Survey
GCDC	Glen Cove Development Company
HEPA	High Efficiency Particulate Air
HSCP	Health and Safety Contingency Plan
HPGe	High Purity Germanium
HPT	Health Physicist Technician
HSA	Historical Site Assessment
IRA	Interim Remedial Action
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MAC	Material Acceptance Criteria
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/m³	milligrams per cubic meter
NaI	Sodium Iodide
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NRC	Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
pCi/g	picocuries/gram
PCB	Polychlorinated Biphenyl
PHP	Project Health Physicist
PM	Project Manager
POTW	Public Owned Treatment Works
PPE	Personal Protective Equipment

PRM	Program Manager
QAPP	Quality Assurance Project Plan
QCP	Quality Control Plan
QCSM	Quality Control System Manager
Ra	Radium
RAO	Remedial Action Objectives
RASS	Remedial Action Support Survey
RAWP	Remedial Action Work Plan
RC	Radiochemist
RCRA	Resource Conservation Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RQ	Reportable Quantity
SAP	Sampling and Analysis Plan
SOPs	Standard Operating Procedures
SOW	Scope of Work
SSHO	Site Safety and Health Officer
SZ	Support Zone
Th	Thorium
uCi/ml	microcuries per milliliter
WAC	Waste Acceptance Criteria
XRF	X-ray Fluorescence

TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION AND SCOPE OF WORK	1-1
1.1 Overview of Remedial Process.....	1-1
1.2 Remedial Design.....	1-2
1.3 Site Description.....	1-3
1.4 Site Background.....	1-3
1.5 Site Characteristics.....	1-4
1.6 Project Scope of Work.....	1-5
2.0 PROJECT ORGANIZATION AND PERSONNEL.....	2-1
2.1 Program Manager.....	2-1
2.2 Project Manager.....	2-1
2.3 Construction Superintendent.....	2-2
2.4 Quality Control System Manager	2-2
2.5 Certified Health Physicist	2-3
2.6 Site Safety and Health Officer and Project Health Physicist.....	2-3
2.7 Radiochemist.....	2-4
2.8 Health Physics Technician.....	2-4
3.0 REMEDIAL ACTION SCHEDULE.....	3-1
4.0 SITE MANAGEMENT AND OPERATIONS	4-1
4.1 Mobilization.....	4-1
4.1.1 Facility Setup and Layout	4-1
4.1.2 Work Zones.....	4-2
4.2 Personnel Training	4-2
4.3 Permitting and Local Coordination.....	4-2
4.4 Site Security	4-3
4.4.1 Site Perimeter.....	4-3
4.4.2 Personnel Control.....	4-3
4.5 Remedial Process	4-3
4.5.1 Clearing and Grubbing.....	4-3
4.5.2 Sediment and Erosion Controls	4-4
4.5.3 Construction Storm and Groundwater Water Management.....	4-4
4.5.4 Pre-excavation Surveys.....	4-4
4.5.5 Precision Excavation of Contaminated Soil	4-5
4.5.6 Loading of Contaminated Material.....	4-9
4.5.7 Backfill Management.....	4-10
4.6 Final Status Surveys.....	4-10
4.7 Decontamination and Release Surveys.....	4-12
5.0 REMEDIAL MATERIAL MANAGEMENT	5-1
5.1 Material Classification	5-1
5.2 Shipping Paperwork, Labels, and Markings	5-2
5.3 Equipment and Vehicle Maintenance	5-2
5.4 Shipment Notifications	5-3
6.0 SITE REGRADING.....	6-1
7.0 REFERENCES.....	7-2

LIST OF TABLES

Table 1-1	Site-Wide Cleanup Levels
Table 4-1	Acceptable Surface Contamination Levels
Table 5-1	Reportable Quantities

LIST OF FIGURES

Figure 1-1	Li Tungsten Superfund Site Layout
Figure 2-1	Project Organization Chart
Figure 3-1	Project Schedule
Figure 4-1	Project Site Layout
Figure 4-2	Areas of Soil Contaminated With Radionuclides
Figure 4-3	Areas of Soil Contaminated With Metals

LIST OF APPENDICES

Appendix A	Health and Safety Contingency Plan
Appendix B	Sampling and Analysis Plan
Appendix C	Contractor Quality Assurance Project Plan (Amendment)
Appendix D	ECC Standard Operating Procedures

1.0 PROJECT DESCRIPTION AND SCOPE OF WORK

ECC presents this Remedial Action Work Plan (RAWP) for the Li Tungsten Superfund Site (Site) in Glen Cove, New York. The location of the Li Tungsten Superfund Site is shown on Figure 1-1.

This RAWP plan addresses the activities to be performed to implement the remedy described in the Final Remedial Design (FRD) Report. The activities of this RAWP are designed to comply with the FRD specification documents, as specifically referenced herein, and the EPA Administrative Order.

This RAWP provides a description of the Site activities, the technical approach, operations, monitoring, and overall management strategy for the Remedial Action.

ECC will implement the attached Health and Safety Contingency Plan (HSCP), and Sampling and Analysis Plan (SAP). ECC has reviewed and appended as necessary the *URS Li Tungsten Construction Quality Assurance Project Plan (CQAPP) for the Remedial Phase of Work, Version 1, September 2001*.

The submission of this RAWP is not intended to imply that ECC concurs in the remedy ordered by the Environmental Protection Agency (EPA) for the Li Tungsten Superfund Site, or in the administration, enforcement or implementation of the remedy by EPA and/or other agencies of the Government.

1.1 Overview of Remedial Process

EPA issued a Record of Decision (ROD) for the Li Tungsten Superfund Site on September 30, 1999. An Administrative Order, Index Number 02-2000-2037, dated October 5, 2000, which included a Scope of Work (SOW), was issued to a number of potential Respondents. Additionally, EPA issued a letter dated February 8, 2001 to Respondents to the Administrative Order.

The (100%) Final Remedial Design for Parcel B and Upper Parcel C of the Li Tungsten property of Li Tungsten Superfund Site was submitted to the EPA on January 3, 2002. The FRD incorporated EPA's comments on the Pre-Final Remedial Design (95%). EPA approved the FRD by letter dated January 9, 2002 and received on January 14, 2002.

ECC's Final Remedial Action Work Plan (RAWP) was submitted to EPA on September 4, 2002. EPA provided comments to the Final RAWP in a letter dated December 31, 2002. ECC submitted responses to the comment by e-mail on January 23, 2003. EPA then provided additional comments to the January 23, 2003 responses, as documented in a letter dated August 22, 2003. ECC submitted further response to the EPA concerning the additional comments by e-mail dated October 15, 2003.

TDY Industries, Inc. (TDY), one of the respondents to the Administrative Order, was issued notice by EPA on August 22, 2003 to initiate removal and disposal of all contaminated soils

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

staged in the Dickson Warehouse. EPA approved the related sections of the RAWP by letter dated August 22, 2003 and TDY alone implemented those sections of the RAWP.

In May 2005, the EPA, Region 2, issued an Explanation of Significant Differences (ESD) concerning the Li Tungsten Superfund Site. The EPA issued the ESD to change the radiological cleanup criteria in order to address the City of Glen Cove's decision to revise the Glen Cove Creek waterfront revitalization plan to include residential future use of the Site. (EPA, 2005)

By letter dated July 21, 2005, the EPA notified TDY of its approval of ECC's September 2002 RAWP, as modified by subsequent comment responses. EPA also directed TDY to revise and resubmit the Final RAWP. (EPA, 2005A) A revised Final RAWP, dated October 2, 2005 and incorporating changes as directed in the July 21, 2005 letter, was submitted.

By letter dated January 20, 2006, EPA approved the October 2, 2005 Final RAWP, with observations. This revised Final RAWP addresses those observations and includes other minor changes in ECC's project implementation approach.

1.2 Remedial Design

The FRD submitted by URS Corporation on January 3, 2002 details the plans for the completion of the prescribed Remedial Action for the Site. As described in the FRD, implementation of the remedy will include excavation and removal of an estimated 40,200 cubic yards (cy) of potentially contaminated soil using precision excavation. As presented in the ROD, the remedy included:

- Excavation with radioactive waste volume reduction;
- Offsite disposal of soils contaminated with radionuclides and soils contaminated with metals;
- Long-term groundwater quality monitoring; and
- Implementation of deed restrictions.

The goal of the remedial design process was to create a cost-effective and implementable remedial action plan that would satisfy the Remedial Action Objectives (RAOs). The RAOs for building materials for the Li Tungsten Site (Site) are:

- To prevent exposure to building materials contaminated with radionuclides or chemicals of concern through inhalation, direct contact, or ingestion;
- To eliminate hazards to future site workers posed by unstable structures; and
- To remove any structural impediments that might interfere with FRD sampling, and implementation of soil and groundwater remediation

The RAOs for soil and sediment for the Site are designed:

- To prevent or minimize exposure to contaminants of concern through inhalation, direct contact, or ingestion; and
- To prevent or minimize contaminants of concern in soil and/or sediments migrating into underlying groundwater.

The RAOs for groundwater and/or ponded water for the Site are designed:

- To prevent or minimize ingestion, dermal contact, and inhalation of contaminated groundwater within “hot spot” areas on lower Parcel C and on Parcel A;
- To restore groundwater quality to levels that meet federal and state standards; and
- To remediate contaminated surface water in onsite ponds to reduce risks to public health and the environment.

1.3 Site Description

The Site is located in a commercial area along the north side of Glen Cove Creek in the city of Glen Cove on Long Island, New York. The Site location is shown on Figure 1-1. The area around the Site includes light and heavy industry, commercial businesses, a sewage treatment plant, a Nassau County public works facility, and five state or Federal Superfund sites.

The Site occupies approximately 26 acres and includes four parcels designated A, B, C, and C'. The layout of the Site is shown on Figure 1-1. Parcel A contained most of the buildings on the Site and was the location of the main operations center for the facility. Parcel B was generally undeveloped and contains a small pond, intermittent stream and a small wetland. Separate areas of Parcel B were used for parking, disposal, and employee picnicking. Parcel C includes two larger structures (the Benbow Building and the Dickson Warehouse), former surface water impoundments, and former locations of three above ground storage tanks. Parcel C' was not part of the active facility.

Residential housing is located north of the Site. Two Superfund sites lie adjacent to the facility. The Crown Dykman Superfund Site is east of the Li Tungsten property and the Mattice Petrochemical Superfund site is west of the property.

1.4 Site Background

Tungsten ore concentrates, as well as tungsten compounds and other metals were processed at the Li Tungsten facility from 1942 to 1985, primarily for the United States government. This processing resulted in metallic residues containing the naturally occurring radioactive elements thorium (Th), uranium (U), and radium (Ra), as well as the heavy metals arsenic, barium, bismuth, copper, cobalt, chromium, lead, manganese, mercury, nickel, vanadium and zinc. Some metallic residues may have been deposited on Parcels B and C of the Li Tungsten property.

In 1984, the Glen Cove Development Company (GCDC) acquired the property. GCDC continued to lease the property to Li Tungsten Corporation until 1985 when the Li Tungsten Corporation ceased operations at the Site and filed for bankruptcy. The EPA issued an Administrative Order on Consent to GCDC in 1989 specifying nine interim remedial actions (IRAs) including removal of anhydrous ammonia; removal of miscellaneous gas cylinders; removal of drummed materials, including 12 drums containing radioactive thorium metal; over packing and removal of laboratory chemicals; removal of polychlorinated biphenyl (PCB) transformers; and various additional characterization, sampling, and analyses. These IRAs were completed in 1990.

In 1993, the EPA developed a Remedial Investigation/Feasibility Study (RI/FS) work plan. As part of the RI/FS, additional IRAs were conducted during 1995-1996, and prior to performance of the Remedial Investigation (RI) field program. IRAs were initiated in August 1995 and included: removal of debris and vegetation from the target areas of the RI including the inside of the Dickson Warehouse; removal of asbestos and structural repairs to the Dickson Warehouse; and relocation of approximately 5000 cy of tungsten ore residue from Parcels A and C to the Dickson warehouse. Since the IRAs, additional soil was placed in the Dickson warehouse as a result of EPA Phase I activities.

In August, 2003, TDY was ordered by EPA to initiate removal and disposal of radioactively contaminated materials staged in the Dickson Warehouse. EPA approved the applicable sections of this Remedial Action Work Plan (RAWP) prior to ECC commencing work. (ECC, 2002)

In accordance with the approved sections of the RAWP, ECC completed the removal of contaminated soil and debris from the Dickson Warehouse. The period of performance for this task was January 26 - March 5, 2004. Approximately 5,180 tons of waste materials were managed and shipped from the site. (ECC, 2004)

On March 5, 2004, TDY requested that EPA broaden its approval of the project work plans to allow excavation, transportation, and disposal of soils in certain areas of Upper Parcel C and Parcel B. Specifically, the areas are identified in the FRD as Areas RA-A, RA-B, and RA-C. EPA responded on March 10, 2004, granting authorization to proceed with the work under specified conditions. TDY addressed the conditions and notified ECC to proceed with the limited removal. ECC performed the removal in Upper Parcel C between March and April of 2004. Approximately 3,527 tons of wastes were excavated and shipped offsite from Upper Parcel C. (ECC, 2004)

1.5 Site Characteristics

Vegetation covers the ground surface over most of the Site. Natural vegetation in the area of the Site is predominantly shrubs, grasses, and grass-like plants. Groundwater monitoring wells have been installed at various locations around the Site. Generally, the ground surface slopes down to the south toward Glen Cove Creek.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

1.6 Project Scope of Work

The remedial activities to be conducted at Parcel B and Upper Parcel C of the Li Tungsten Superfund Site consist of excavation and offsite disposal of soils contaminated with radionuclides and soils contaminated with metals to satisfy the Site Cleanup Criteria specified in the ROD¹. Compliance with Site Cleanup Criteria will be demonstrated using the procedures in the Multi-Agency Radiological Site Survey and Investigation Manual (MARSSIM) (EPA 402-R-97-016) and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846).

The scope of work includes:

- Preparation of the Remedial Action Work Plan;
- Mobilization;
- Setup and Material Acceptance Criteria (MAC) and Waste Acceptance Criteria (WAC) sampling;
- Clearing and grubbing;
- Precision excavation and stockpiling of soils contaminated with radionuclides and soils contaminated with metals;
- Final status survey of excavated areas for radionuclides and metals, in accordance with MARSSIM and SW-846;
- Ongoing material confirmation sampling, as required, to assure material characteristics have not changed;
- Preparing Manifests or Bills of Lading of material shipments for recovery or disposal;
- Transfer of excavated radioactive contaminated soils into the Dickson Warehouse for temporary storage;
- Loading of stored radioactive contaminated soils for transport and disposal to offsite facility;
- Excavation and direct loading of metals contaminated soils into dump trucks, roll-off containers, or similar transport containers for offsite disposal;
- Decontamination of chassis, trucks, or the exterior of intermodal containers prior to leaving the Site;
- Decontamination of Dickson Warehouse and final clearance survey, in accordance with MARSSIM;
- Site regrading;
- Demobilization; and
- Final Report.

Site-wide soil cleanup levels established by the EPA, as part of the ROD and revised by the ESD, are summarized in the Table 1-1

¹ Parcel A has already been remediated.

Final Remedial Action Work Plan
 Li Tungsten Superfund Site
 Glen Cove, New York

Table 1-1
Site-Wide Cleanup Levels

Parameter	Cleanup Levels
Arsenic (soil)	24 mg/kg
Lead (soil)	400 mg/kg
Arsenic (sediments) ^a	6 mg/kg
Lead (sediments) ^a	31 mg/kg
Thorium-230 + Thorium-232 (soil)	≤ 5 pCi/g plus background level ^b
Radium-226 + Radium-228 (soil)	≤ 5 pCi/g plus background level ^b
PCBs in the dumping area (middle) of Parcel B (soil)	1 mg/kg in the top 2 feet
PCBs in the dumping area (middle) of Parcel B (soil)	10 mg/kg below the top 2 feet

^a There are no locations in Parcels B and Upper Parcel C to which the criteria apply. Sediment criteria were obtained from the *Technical Guidance For Screening Contaminated Sediment*, (Technical Guidance). Criteria are identified as “To Be Considered” ARARs. As defined in the Technical Guidance, sediments are “a collection of fine-, medium-, and coarse- grain materials and organic particles that are found at the bottom of lakes and ponds, rivers and streams, bays, estuaries, and oceans”. Criteria for arsenic and lead are based on oligotrophic waters with low concentrations of metals-complexing ligands and are over protective when applied to eutrophic waters. (The Technical Guidance further cautions that a decision to remediate should not be based on exceedances of these criteria.) No areas have been identified within Parcels B and Upper Parcel C that meet the definition of sediment or the criteria upon which the sediment screening criteria are based.

^b Background levels are 1 picocurie per gram (pCi/g) each for Th-230, Th-232, Ra-226, and Ra-228.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

2.0 PROJECT ORGANIZATION AND PERSONNEL

The project organization is shown in Figure 2-1. Key personnel and their responsibilities for the tasks described in this RAWP are listed below.

2.1 Program Manager

The ECC Program Manager (PgM), Mr. Marc Mizrahi, is responsible for overall conformance of the work to Federal, State, and local regulations. PgM duties and responsibilities include the following:

- Contract execution oversight;
- Overall contract conformance to remedial design requirements and specifications, including technical, cost, and schedule;
- Overall responsibility for the success and proper execution of the Contract and all task orders;
- Tracking proposed changes to the project SOW;
- Communicating directly with the performing parties regarding project execution and accountability;
- Review and timely submission of all required submittals;
- Designation of the Project Manager (PM) and Quality Control System Manager (QCSM); and
- Allocation of sufficient resources to ensure successful completion of the scope of work.

2.2 Project Manager

Mr. Phil O'Dwyer is the PM for this project. Mr. O'Dwyer reports directly to the PgM and will officially represent the Contractor in all project-related activities. The PM duties and responsibilities include the following:

- Initiation of project planning and implementation of project activities;
- Managing the project budget and schedule, with concurrence from the PgM, ensuring Contract requirements are satisfied;
- Managing all field construction activities, including the direction of project staff and subcontractors in accordance with requirements of the Contract documents;
- Identification and oversight of offsite laboratories to perform analytical as required by the CQAPP;
- Tracking proposed changes to the project SOW;

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

- Communicating directly with the performing parties regarding project execution and accountability;
- Coordinating with the QCSM to ensure compliance with standard protocols and procedures and implementation of the RAWP;
- Coordinating with the Site Safety and Health Officer (SSHO) to ensure implementation of the Health and Safety Contingency Plan (HSCP); and
- Procuring equipment, material, and supplies.

2.3 Construction Superintendent

Mr. Tom Gilbertson is the Construction Superintendent (CS) for this project. The CS duties and responsibilities include the following:

- Project planning;
- Maintaining the project budget and schedule up to date ensuring daily Contract administrative requirements are satisfied;
- Managing all field construction activities, including the direction of project staff and subcontractors in accordance with requirements of the Contract documents and Federal, State, and local regulations governing the project;
- Coordinating with the QCSM to ensure compliance with standard protocols and procedures and implementation of the RAWP;
- Coordinating with the SSHO to ensure implementation of the HSCP;
- Maintaining the project activities logbook; and
- Procuring equipment, material, and supplies.

2.4 Quality Control System Manager

The QCSM for this project is Ms. Mirna Zahlan. Ms. Zahlan will report directly to the ECC Environmental Division Director, Mr. August Ochabauer, and has the authority to act independently in all quality control (QC) matters. This person will provide part time oversight to the project and will not typically be onsite. The QCSM duties include the following:

- Supervising QC aspects of the project to ensure compliance with Contract plans and specifications as defined in the Contractor Quality Control Plan (CQAPP);
- Managing project QC;
- Approving all submittals and supervising all QC procedures; and
- Maintaining communication between project management and project team members; acting as the primary spokesman on quality matters when interfacing with external organizations.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

2.5 Certified Health Physicist

Mr. Keith Anderson is the Certified Health Physicist (CHP) for this project. His CHP responsibilities include development and implementation of all radiation safety activities. He also is responsible for the project radiation-monitoring program. In addition, the CHP will oversee all operations relating to radioactive material sampling and develop the supporting data for meeting the respective recovery or disposal facility MAC or WAC. He also will be responsible for final status survey plans, performance of site audits, signing the HSCP, and development of data to demonstrate compliance with the remedy. He supervises the Project Health Physicist (PHP) and the SSHO regarding radiation safety monitoring and reporting functions.

2.6 Site Safety and Health Officer and Project Health Physicist

Mr. Theodore Johnson is the SSHO and PHP. Mr. Johnson reports to the CHP and PM and will oversee the daily coordination of all radiation safety activities, including surveys, routine and special monitoring, sampling, and other health physics requirements. The SSHO/PHP will operate radiation detection instruments, perform nuclear statistics collation and integration, and assist in the interpretation of analytical results. He will be responsible for maintaining proper operating conditions and calibration records for all radiation detection equipment. The PHP is responsible for supervising sampling tasks to ensure compliance with the project plans and specifications. To carry out these responsibilities, the PHP has the authority to perform the following functions:

- Implementing and enforcing the HSCP;
- Ensuring site compliance with Federal, State, and Occupational Safety and Health Administration (OSHA) safety and health regulations;
- Coordinating modifications to the HSCP with the ECC Safety and Health Manager, Corporate Certified Industrial Hygienist (CIH) and CHP;
- Maintaining the Safety and Health Logbook;
- Ensuring that the quality of data meets project QC objectives;
- Providing recommendations concerning project QC objectives;
- Ensuring consistent QC procedures are in-place during the performance of project sampling and analysis activities;
- Ensuring that QC procedures for the sampling activities are conducted in a manner consistent with EPA guidance and the CQAPP;
- Recommending corrective action procedures to maintain project QC objectives;
- Evaluating data deliverables for compliance with CQAPP requirements;
- Coordinating the implementation of laboratory and field audits with the CHP;

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

- Conducting field and laboratory audits to ensure that project QC requirements are implemented;
- Reviewing field and laboratory audit reports with the CHP and assist in implementing any corrective action identified by the field or laboratory audits;
- Providing technical guidance to the project management team;
- Implementing project QC requirements and coordinate field and laboratory data validation;
- Ensuring that corrective actions are implemented when QC out-of-control situations are identified;
- Performing announced and unannounced audits during sample collection;
- Checking chain-of-custody records for correctness and accuracy; and
- Reviewing analytical procedures and results to evaluate the analytical QC parameters of reported analytical results.

2.7 Radiochemist

The Radiochemist (RC) is responsible for the day to day operations of the onsite laboratory and will report to the PHP. The RC will calibrate and operate the gamma spectroscopy system and perform moisture testing. The RC generates onsite laboratory QC and analytical reports and is responsible for maintaining the onsite laboratory equipment.

The RC also coordinates shipment of samples for offsite alpha spectroscopy analysis and review data from that qualified laboratory.

2.8 Health Physics Technician

The Health Physics Technicians (HPTs) report to and interface with the SSHO, CHP, and PHP for survey protocol and technical issues. The HPTs perform the radiation monitoring of the materials for disposal purposes and maintain the radioactive survey records of the materials and the site. They also perform site safety monitoring activities as required to support the SSHO.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

3.0 REMEDIAL ACTION SCHEDULE

The Project Schedule shows the estimated duration and critical path of each task (Figure 3-1). ECC will conduct the following task sequence for completion of the requirements of the project SOW.

Prepare Remedial Action Submittals

- Preparation and revision of RAWP, SAP, HSC, and CQAPP through amendment of the existing CQAPP;
- EPA Review; and
- Finalization of Plans.

Remedial Action

- Site Mobilization, site setup, MAC/WAC sampling;
- Clearing and grubbing;
- Excavation and handling of soil contaminated with radionuclides;
- Transferring soils contaminated with radionuclides to the Dickson Warehouse for consolidation
- Excavation of soil contaminated with metals from Parcel B;
- Loading and transport of soil contaminated with metals from Parcel B;
- Excavation of soil contaminated with metals from Parcel C;
- Loading and transport of soil contaminated with metals from Parcel C;
- Loading and transport of soil contaminated with radionuclides from Dickson Warehouse for offsite disposal;
- Decontamination and closure of Dickson Warehouse;
- Final Status Survey (FSS) for radionuclides;
- FSSs for metals;
- Site regrading; and
- Demobilization.

Post Remedial Activities

- Preparation of Final Report

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

4.0 SITE MANAGEMENT AND OPERATIONS

The following sections describe the primary operational activities as identified in the Project Scope of Work (Section 1.6).

4.1 Mobilization

Upon notification to proceed by the performing parties, and consistent with the schedule, ECC will mobilize equipment and personnel to Site.

When possible, local personnel and equipment will be utilized for remedial activities. Additional personnel and equipment may be added as required based on site conditions and scheduling requirements. During the performance of the remedial action, ECC will be mobilizing the following equipment or equivalents:

- CAT 320 and 322B excavators;
- CAT 960F wheeled front end loader;
- CAT D6 bulldozer;
- A container closing (scaffolding) rack;
- High Purity Germanium (HPGe) gamma spectroscopy system;
- Numerous scalers;
- Lapel air monitors;
- Hand held radiological instrumentation;
- Low and high volume air monitors; and
- Assorted environmental and health and safety monitoring instruments.

Equipment numbers and types may vary to fit site conditions and optimize productivity. Project and construction equipment will only be mobilized, utilized, and decontaminated, as necessary. An office trailer will be mobilized to house the project management team, the break trailer, and the radiological field laboratory and instrumentation.

As part of mobilization activities, ECC may have utility services installed for its onsite facilities. A licensed electrician will install this service and will ensure that all utilities are located and secured away from heavy traffic.

4.1.1 Facility Setup and Layout

As the project progresses, temporary facilities and controls will be established, as needed, to complete the remedial work. These may include utilities, construction access roads, parking areas, and construction trailers. Onsite haul roads may be constructed of recycled concrete or locally supplied aggregate.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

When not in use, all equipment will be secured in the designated equipment area within the work zone where it is being used.

ECC will employ engineering controls to manage dust, water, erosion, etc. Perimeter air monitoring devices will be installed during site setup to monitor for airborne radionuclide and metals contaminants. These procedures are presented in the HSCP included in Appendix A.

As shown in Figure 4-1, the facility layout plan delineates the areas to be utilized for site support of personnel and equipment, as well as an interim containerized material staging area for the transfer of contaminated soils for offsite recovery or disposal.

4.1.2 Work Zones

Specific work zones will be established and reconfigured as the project progresses. These work zones include the Exclusion Zone (EZ), the Contaminant Reduction Zone (CRZ) and the Support Zone (SZ) and are defined in the HSCP. Decontamination pads will be located in the CRZ and will be fitted with a rinsate collection system.

4.2 Personnel Training

During the mobilization phase, all project personnel will be provided with site orientation and training. Topics will include radiation training, exposure monitoring, protective equipment, hazard communication, emergency reporting, and site security. Personnel training procedures are described in detail in the HSCP (Appendix A.)

4.3 Permitting and Local Coordination

The consistency of the remedial action with New York State and Glen Cove Coastal Policies, the National Historic Preservation Act and Freshwater Wetlands Act was demonstrated and documented in *Section 5.0 (Permit Plan)* of the *FRD*. The findings of the reports identified in the *FRD* noted that no further action was necessary. Therefore, no further Federal or State permit requirements have been imposed upon the Remedial Action.

A request to the Public Works Department of the City of Glen Cove is anticipated for use of water hydrants and valves. If discharge of project generated wastewater to the storm water sewer system is required, ECC will coordinate with the Glen Cove Public Works Department. Radiation limits for such discharge are gross alpha < 40 pCi/l and gross beta < 200 pCi/l.

ECC will coordinate with representatives of the local utilities and initiate a site survey for identification and marking of all underground utilities. These activities will aid in protecting the utilities and the health and safety of ECC's employees.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

Additional coordination with local authorities will include notification to the local Glen Cove and the New York State police departments if obstruction of the public way is expected due to project operations and coordinating with local emergency response personnel. These contingencies are described further in the HSCP.

If access to an adjacent property is required during the course of the Remedial Action, ECC will seek permission from the owner of the property.

4.4 Site Security

Site security measures will be executed by ECC while on the project site and include the following controls:

4.4.1 Site Perimeter

The existing perimeter fence will be repaired to limit access. Only appropriately trained and authorized personnel will be allowed access through established ingress/egress points. The site will be posted with signs worded in accordance with the requirements of *FRD specification 1580, Project Signs*.

4.4.2 Personnel Control

Every day that field operations are conducted, ECC will account for all personnel on site and ensure each has been authorized and appropriately trained. All visitors to the site will be required to sign in, be briefed on site orientation and safety, and read and sign the HSCP. The HSCP describes personnel training issues in further detail.

4.5 Remedial Process

The remedial process will be initiated in accordance with the FRD unless otherwise noted. The primary activities of the remedial action are described in this section.

4.5.1 Clearing and Grubbing

The clearing and grubbing of the Parcel B and Upper Parcel C will include delineation of work areas and areas of known contamination, clearing debris, and cutting of vegetation existing within the limits of the work area. Stumps may be ground and consolidated with the cleared vegetation. Vegetation and debris taken from areas with known contamination (either radionuclides or metals) will be segregated from vegetation and debris removed from areas that do not exhibit contamination. These materials will be screened to determine their disposition. Material that has been cleared as uncontaminated may be deposited in a clean area within the work site.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

4.5.2 Sediment and Erosion Controls

Sediment and erosion controls will be placed during the early phases of the remedial action. Runoff water will be diverted to prevent ponding in excavation areas. Samples of potentially contaminated water will be collected for analysis. Analysis may include pH and radionuclide assessment. If not contaminated the water may be filtered for particulates and reused on site for dust suppression.

4.5.3 Construction Storm and Groundwater Water Management

Previous investigations of the Site indicate it to be unlikely that excavations within Parcel B and upper Parcel C will reveal residual radioactive contamination greater than the release criteria at locations below the water table. However, soils that lie below the water table and that exceed release criteria for residual radioactive materials will be excavated.

A comparison of expected excavation depths to the remedial investigation data indicates that groundwater may be encountered during excavation. (Malcolm Pirnie, 1998). Current depth to water table will be evaluated using exiting monitoring wells to identify potential problem areas within the excavation. Further analysis will be based upon the review of proposed excavation depths against historical water table data and the potential for inflow of groundwater and storm water into the excavations.

Construction storm water and groundwater management will include protection of the excavation perimeter using silt fences or straw bales. Groundwater or storm water from excavations will be pumped directly into large capacity holding tanks. Pumping equipment will be fitted with a series of micron-size filters to remove suspended sediment. Crews will then collect samples from the large capacity holding tanks. Collected water will be direct discharged to the storm water sewer system if gross alpha is less than 40 pCi/l and gross beta is less than 200 pCi/l. ECC will also coordinate with the City of Glen Cove Public Works Department in the event of direct discharge to the storm water sewer system.

4.5.4 Pre-excavation Surveys

The details of the pre-excavation surveys are presented in the Sampling and Analysis Plan (SAP) included in Appendix B. The following summarizes the pre-excavation survey plans.

4.5.4.1 Site Grid System

A 10-meter grid system will be established over the entire site and will be based on existing survey control points.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

4.5.4.2 Pre-Excavation Screening

ECC will perform pre-excavation screening surveys by making *in situ* measurements. ECC will utilize portable gamma scintillators and x-ray fluorescence (XRF) instrumentation to conduct the surveys. Contaminant readings for radionuclides and metals will be collected and reviewed to identify areas requiring excavation, and to confirm the general nature, degree, and extent of existing contamination. This data will be compared to data collected in the URS pre-design data, the EPA sampling/analytical data for lower Parcel B, and the ECC data.

Pre-screening will be performed of the area in the vicinity of SB-14 (in the middle area of Parcel B) to determine the vertical and horizontal extent of PCBs in excess of Table 1-1.

Geoprobe sampling of subsurface conditions has been performed in Parcels B and C. Downhole gamma logging and sampling will be conducted. Samples will be screened on site and with the portable XRF Unit. Data collected from subsurface sampling will provide supplemental information for waste segregation in accordance with the acceptance criteria of the selected offsite disposal facilities.

4.5.4.3 Cross-Correlations

The PHP will develop site-specific correlations for the portable survey instruments. The correlations involve performing field measurements at selected soil sampling locations, collecting soil samples, and analyzing these samples at the onsite and/or offsite analytical laboratory. The PHP will use these correlations to guide the excavation of contaminated soils, and to conclude when removal objectives have been achieved. The final extent of any excavation will be verified with confirmation sampling.

4.5.4.4 Material Characterization

ECC has collected samples for characterization analyses. The analytical data will be used to establish profiles for Li Tungsten material to demonstrate compliance with the federal and state transportation regulations and to ensure that the material conforms to Material Acceptance Criteria (MAC) or Waste Acceptance Criteria (WAC) of selected disposal sites. The analyses also will provide quantitative analytical data for Ra-226, and for Th-232 concentrations in the excavated material. Analytical results of Ra-226 will be utilized as a surrogate for Th-230 as being in secular equilibrium. Analytical results of Th-232 will be utilized as a surrogate for Ra-228 as being in secular equilibrium.

4.5.5 Precision Excavation of Contaminated Soil

The purpose of precision excavation will be to segregate materials between those being sent to the offsite radioactive soils disposal facility from those being sent to the offsite metals-contaminated soil disposal facility(s). Work will commence in areas identified by the FRD and confirmed by Pre-excavation screening procedures described in Section 4.5.4.2 of this RAWP.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

ECC will strive to minimize the material generated from this remedial action. ECC will focus on segregating soils contaminated with radionuclides and transfer these to the Dickson Warehouse for temporary staging. Excavation of metals contaminated soils will then be performed, with excavated materials direct loaded for offsite disposal. Soils staged in the Dickson Warehouse will then be transferred for offsite disposal. This procedure will help ensure cost-effective remediation and volume minimization.

Results of the waste characterization effort and determination of recovery and/or waste disposal facilities will direct ECC's segregation and loading activities.

4.5.5.1 Radionuclide-Contaminated Soil Excavation

Excavation of soils contaminated with radionuclides will be performed in areas RA-A, RA-B, and RA-C (Figure 4-2). The guidance for excavation procedures presented in the remedial design will be integrated into the field approach. ECC will excavate in lifts according to the characterization data and depth of contamination in each area. Most areas will be excavated in 1-foot lifts. The sequence of removal will be area RA-A (if required), area RA-B (if required), and area RA-C, with excavated soils staged within the Dickson Warehouse. Material handling procedures will be finalized following review of the characterization data and upon selection of a recovery and/or disposal facility. ECC will stockpile the excavated soils to reflect the MAC or WAC criteria of selected recovery and/or disposal facilities.

A Remediation Action Support Survey (RASS) for radionuclides will be performed to collect data to assist with waste segregation. Data will provide field crews with the necessary information to segregate materials. Materials will be segregated between those placed into the Dickson Warehouse and those sent to the metals-contaminated soils disposal facility(s). The HPT will conduct the RASS using a portable gamma scintillator coupled to a scaler/ratemeter. The entire survey unit will be surveyed with a shielded two inch by two-inch sodium iodide (NaI) detector coupled to a ratemeter/scaler or a microR exposure ratemeter.

Additional soil sampling may be performed during the RASS if determined necessary by survey personnel.

Excavation of radionuclide-contaminated soil will continue to the predetermined cutlines as noted in Figure 4-2. Excavation will then continue in 1-foot lifts or according to the cutlines as noted in Figure 4-3. The RASS will be performed with the goal of achieving waste segregation.

The RASS will continue throughout the excavation in order to verify compliance to the MAC or WAC of the metals contaminated soil disposal facility(s).

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

4.5.5.2 Metal-Contaminated Soil Excavation

Upon completion of the radioactive materials removal phase, site setup will be reconfigured for removal of the metal-bearing soils. New haul roads may be constructed. ECC anticipates constructing a haul road from the northern part of area SA-C, Parcel B, toward the south end of Parcel B (Figure 4-3). The haul road will permit the excavation of SA-C to proceed from the north to the south, proceeding into area SA-B. Figure 4-3 shows the location of the haul road. The proposed sequence eliminates the need to stockpile materials on areas not previously identified as contaminated. The ECC field crew will initiate excavation of area SA-A, Parcel C, once the excavation is completed in area SA-B, Parcel B.

Utilizing the established grid system, each survey unit will be surveyed at the 10-meter grid nodes with a XRF unit. Results of these surveys will be used to determine if further excavation is required or if the grids are eligible for a Final Status Survey (FSS).

The excavation of area SA-A, Parcel C, will be initiated from the eastern edge of the area and proceed to the western portion of the parcel. The excavation will be sloped and graded as required to maintain safety of site personnel and compliance with federal, state, and local requirements. Slope stabilization techniques will be employed throughout the removal effort. Benching of excavations will be performed when necessary to allow entry of HPTs. Shoring of the Dickson Warehouse may be required along sections of its foundation during excavation of metals contaminated soils. The data in the Final Remedial Design is not sufficient to plan for shoring with certainty. As part of further site characterization work, ECC will collect samples from soils along the Dickson Warehouse foundation. The resulting data will better define the limits of contamination near the structure. Depth and proximity of the excavation to the foundation, as well as condition of the foundation, will dictate the appropriate shoring methods.

The design and installation of shoring will be approved by a New York State Registered Engineer. At this time, ECC believes that, in the event it is required, foundation piling and/or underpinnings will be effective in preventing damage to the building foundation. The OSHA technical manual Sec. Five, Ch.2 provides accepted engineering practices for hazard recognition and mitigation for shoring and trenching.

4.5.5.3 Confirmation and Characterization Surveys

The Confirmation and Characterization Survey (CCS) is performed to demonstrate compliance with the federal and state regulations that govern transportation of Li Tungsten material and the MAC or WAC for the offsite destination facility. The CCS also provides quantitative analytical data for Ra-226 + Ra-228, and for Th-230 + Th-232 concentrations present in excavated materials.

Confirmation samples will be collected from the excavated materials. The samples will be analyzed at the onsite lab and/or at an offsite facility. Quality Control of the onsite laboratory will be maintained as defined by the procedures outlined in the Contractor

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

Quality Assurance Project Plan addendum, included in Appendix C. The radiological samples will be counted onsite using the Canberra HPGe Gamma Spectroscopy System. Metals-contaminated soil samples will initially be screened with the XRF and/or sent for offsite analysis. The offsite laboratory will report concentration-based results for Ra-226, Ra-228, Th-230 and Th-232 in pCi/g and for arsenic and lead in milligrams per kilogram (mg/kg). The data will be used to confirm that previously calculated correlations remain accurate for both the gamma scintillation and XRF instruments. In addition, the data will be used to confirm that the characteristics of the material conform to the destination facility MAC or WAC. The results also will be used as additional indicators for the RASS surveys. Data for Ra-226, Ra-228, Th-230, and Th-232 will be used to establish ratios between Ra-226 and Ra-228, and Th-230 and Th-232. Ratios will be used to calculate the concentration of Ra-228 and Th-230.

A predetermined sampling frequency will be applied to the excavated materials. The frequency of confirmatory samples will be one for every 1000 cy excavated from the site. A confirmatory sample consists of the composite of five discrete sampling locations.

The frequency of waste verification sampling is not determined by definitive regulatory or technical guidance documents. The intent of the sampling frequency is to ensure that material transported for disposal does not exceed the disposal facility waste acceptance criteria and that US Department of Transportation requirements are not exceeded. The specified sampling frequency is sufficient to demonstrate compliance to the following:

- MAC or WAC for the selected disposal facilities;
- Verify that package contents do not exceed a reportable quantity as defined by 49 CFR 172.101; and/or
- Verify the package does not exceed the definitive specific activity limit of radioactive materials as stated in 49 CFR 173.403

4.5.5.4 Supplemental RASS

The Supplemental RASS survey will be performed once again following the excavation of the radionuclide-contaminated and metals-contaminated soils. The Supplemental RASS survey will be performed in order to demonstrate that the Derived Concentration Guideline Limits (DCGLs) have been met and the final status surveys may proceed.

Additional excavation may be performed if an area of residual contamination is detected above the DCGLs. The elevated area will be flagged on an excavation map if further remediation is not feasible. A comprehensive survey and appraisal of the impact of the area of elevated contamination will be completed during the Final Status Survey (FSS) phase.

The RASS of each final grid area will include a 100% walkover survey that will be used to demonstrate compliance to the DCGLs. Results of the survey will also be used to calculate and establish the spacing and frequency of the FSS samples.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

A RASS for metals will be performed to gather data necessary to determine whether the metals cleanup criteria was exceeded, and if so, the surface area and concentration of the exceedance. An XRF unit will be used during the remediation of the metals-contaminated soils to monitor the progress of the excavation. Arsenic levels will be used as an indicator compound for metals contamination in the area. Excavation will cease when the XRF field screening indicates that site cleanup criterion have been achieved.

The XRF Unit selected for use in the RASS is capable of screening for single metals as set by the calibration and verified by performance checks in the field. Additionally, the Final Remedial Design Report indicates that excavation of soils containing arsenic in excess of ROD cleanup levels will also result in excavation of all soils containing lead in excess of ROD cleanup levels. (URS, 2002) As such, arsenic has been selected as the indicator constituent.

Once the removal of the materials in area SA-A, Parcel C is completed, a FSS will be performed. The SAP in Appendix B presents the RASS and FSS Procedures.

4.5.5.5 Decontamination of the Dickson Warehouse

ECC plans to achieve the unrestricted release of the Dickson Warehouse by decontaminating the structure, as necessary, and surveying potentially contaminated surfaces according to FRD specification 02221 and accepted MARSSIM protocol. Following a structural stability survey, ECC will perform decontamination tests on select surfaces to determine the effectiveness of power-washing and High Efficiency Particulate Air (HEPA) vacuum approach. Assuming the decontamination tests are successful, ECC will zone the survey areas according to MARSSIM protocol and proceed with decontamination.

Water used for decontamination will be metered and all resulting wastewater will be collected and measured. The volume of water used during decontamination will be noted in the Daily Quality Control Report (DQCR). Other materials generated during decontamination will be collected and consolidated with like materials.

4.5.6 Loading of Contaminated Material

Loading stations will be constructed near excavation points or in areas where consolidation and conditioning will occur. Conditioning with drying agent or blending of soils to achieve homogenization may be required to assure the soils meet the WAC or MAC requirements. Contaminated soils will be loaded into intermodal containers or similar containers (for radioactive soils) and dump trucks other similar containers (for metals-contaminated soils) using front-end loaders and excavators.

While loading soil from staged, stockpiled, or excavation areas, ECC will periodically collect and analyze samples to ensure the material fits the profile and MAC or WAC of the destination facility. This confirmatory sampling method, previously described in

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

Section 4.5.4.3, will consider the concentration of contaminants compared to the MAC or WAC of the selected destination facility.

The radioactive soils transferred to and stored in the Dickson Warehouse will later be staged and loaded directly into approved shipping containers. Loading activities will also consider the structural integrity of the building.

Loading areas will include scaffolding structures needed for closing each load. The exterior of each conveyance will be decontaminated. Unrestricted release surveys will be performed to meet the requirements of 49 CFR 173.433 prior to release of each vehicle to the public way.

The specific procedures for loading into intermodal containers (for radioactive soils) and dump trucks (for metals-contaminated soils) are discussed in *Appendix D, ECC Standard Operating Procedures (ECC SOP-R804)*.

When loading has been completed from each stockpile area, a FSS will be conducted (Appendix B).

4.5.7 Backfill Management

Areas of excavation will be graded and contoured to minimize erosion and to eliminate inherently unsafe conditions (i.e. holes, pits, depressions). Grading and contouring will be performed in manner that does not impede future development. Backfill material will not be used for restoring existing site grading. Rather, backfill materials will only be used to minimize erosion and eliminate unsafe conditions. Backfill materials are not anticipated to be required for site regrading based upon preliminary evaluation of the planned excavations.

Field Crews will follow the backfill soils chemical testing requirements of Section 02300, *Earthwork and Precision Excavation*, in the event that backfill material is required. Sampling will be conducted of backfill supply locations prior to being imported to the Site. Profile samples will be taken of the soil to verify the absence of hazardous, radioactive, or toxic contaminants. Physical testing of the imported backfill material will also be performed to verify that the material is sufficiently stable.

4.6 Final Status Surveys

A Final Status Survey (FSS) Plan will be drafted and submitted to the EPA prior to initiating the FSS. The FSS Plan will address the MARSSIM requirements for demonstrating compliance with the radionuclide cleanup criteria. Further, the FSS Plan will address the components of SW-846 for demonstrating compliance with the metals cleanup criteria. The FSS Plan will be submitted after pre-excavation sampling is performed, as statistical analysis of the data will provide the basis of the frequency and spacing of samples to be collected during the FSS.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

Following final removal of contaminated materials from the Li Tungsten Site, Final Status Surveys will be performed to demonstrate the remedial action has been successful at meeting the cleanup criteria identified in Table 1-1.

For the radiological cleanup criteria, ECC will follow the protocol outlined in the FRD and the guidelines of MARSSIM. The procedures in MARSSIM will be used to demonstrate compliance with the site cleanup criteria of 5 pCi/g plus background for Ra-226 + Ra-228 and 5 pCi/g plus background for Th-230 + Th-232.

For the metal cleanup criteria, ECC will implement Final Status Survey using the protocol of EPA SW-846. This process differs from the methodology identified in the FRD. However, SW-846 provides test procedures and guidance recommended for use in conducting sampling in compliance to the Resource Conservation and Recovery Act (RCRA) regulations. SW-846 sampling methodology is more appropriate for the metal-bearing material. SW-846 provides the methodology for statistical representative sampling, for determining number of samples required based on population variance and sets forth the procedures for establishing sampling grids.

See SAP for complete details (Appendix B).

The Dickson Warehouse

After preliminary decontamination is performed, confirmation surveys will be conducted inside to evaluate the effectiveness of the selected decontamination methods. The areas of the building will be divided in "classes" according to MARSSIM protocols. The extent of scanning surveys, size of survey units and number of integrated measurements will depend upon the final classifications of the interior and exterior of the building.

Walls and ceilings of the building initially will be initially categorized as Class 2, and will be surveyed accordingly. This will include scanning 50% of the lower walls (below 2 meters) and 10% - 50% of the upper walls and ceilings. Consistent with MARSSIM, professional judgment will be used to identify areas expected to have higher potential for contamination. Systematic (grid) sampling locations for fixed measurements and smear samples will be determined following decontamination. Preliminary calculations based on the limited data on the building contained in the RI indicate that approximately 30 sample points will be needed for each survey unit within the building. These units include the floor, the lower walls, and the upper walls and the ceiling. The location and number of sampling points will be refined based on the scanning survey.

The survey will be conducted with a gas-flow proportional detector, capable of measuring alpha and beta emitting radionuclides. Either a 225 square centimeters (cm²) floor monitor or a 100 cm² hand-held probe will be used. Smear samples also will be collected to measure removable contamination.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

Department of Energy (DOE) standard DOE Order 5400.5 and NRC guidance 1.86 were identified in the approved Remedial Design Work Plan and will be used for release of the Dickson Warehouse.

See the SAP for complete details of the MARSSIM survey protocol for the Dickson Warehouse closure survey.

4.7 Decontamination and Release Surveys

ECC field crews will decontaminate field equipment after radionuclide-contaminated materials have been removed as verified by the RASS. Unrestricted release surveys will be performed to demonstrate that all equipment leaving controlled areas meet appropriate surface contamination limits (e.g. NRC Regulatory Guide 1.86) prior to continuing excavation of metals-contaminated materials.

A radiological survey will be performed in the areas intermodals are loaded, twice a day, to investigate contamination levels at the point of loading. If the survey results confirm the absence of contamination, the area will be considered clean. Trucks and intermodals being loaded in a clean area will have a gross area smear survey performed on those areas most likely to become radiologically contaminated (i.e., top of dump bed, tires). The results of these surveys will be compared to the release criteria of 20 disintegrations per minute per 100 square centimeters (dpm/100 cm²). The surface release criteria are those limits from NRC Regulatory Guide 1.86 (see Table 4-1 below). Since no fixed contamination is expected and the radionuclides of concern are Ra-226, Ra-228, Th-230, and Th-232, the release criteria would be either of 20 dpm/100 cm² (for Ra-226 or Ra-228) or 200 dpm/100 cm² (for Th-230 or Th-232). To be conservative, 20 dpm/100 cm² was chosen as the release criteria.

Final Remedial Action Work Plan
 Li Tungsten Superfund Site
 Glen Cove, New York

Table 4-1
Acceptable Surface Contamination Levels

Nuclide^a	Average^{bc} dpm/100 cm²	Maximum^{bd} dpm/100 cm²	Removable^{ba} dpm/100 cm²
U-238, U-nat, U-235, and associated decay products	5,000	15,000	1,000
Ra-226, Transuranics, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-232, Th-nat, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000	3,000	200
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5,000 -	15,000 -	1,000 -

- a Where surface contamination by both alpha-and beta-gamma- emitting nuclides exists, the limits established for alpha- and Beta-gamma-emitting nuclides should apply independently.
- b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive materials as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
- c Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each object.
- d The maximum contamination level applies to an area of not more than 100 cm².
- e The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

5.0 REMEDIAL MATERIAL MANAGEMENT

This section addresses: material classification; material shipping paperwork, labels and markings and notifications; and equipment and vehicle maintenance.

5.1 Material Classification

FRD specification 02350 will be used as guidance for preparing and managing shipping papers. As described herein, radiological waste materials will be stockpiled and stored in the Dickson warehouse. Waste materials will not be removed from the Dickson warehouse until the FSS of all excavations determines the areas meet ROD cleanup criteria.

Classification, under requirements of 49 Code of Federal Regulations (CFR), of loaded intermodals for Li Tungsten requires radioisotope activity levels, estimated metals concentrations and the weight of the shipment. This data will be collected during the CCSs. The weights will be documented during the closing and release survey procedure.

Using the weight of the intermodal, a calculation will be performed to classify the shipment as a Class 7, Class 9, or other shipment. The classification of the conveyance is determined on the weight of the conveyance and the concentrations of metals and radionuclides in the conveyance.

A Class 7 (Radioactive) shipment of soil would be for material that exceeds both the activity concentrations and total activity per conveyance listed in 49 CFR 173.436 for the radionuclides present. The calculation of activity concentrations and total curie content of the conveyance is a sum of fractions calculation for the radionuclides present in the conveyance. Based on the average concentrations of radionuclides present within the excavation areas, and the weight of the conveyances, most radiological waste shipments from the Li Tungsten site will be Class 7.

**Table 5-1
Reportable Quantities**

Contaminant	RQ	Average Concentration*	Estimated Concentrations RQ Exceedence	
			Intermodal	Tandem Dump
Radium-226 ^a	0.1 Ci	42.8 pCi/g	4830 pCi/g	8050 pCi/g
Radium-228 †	0.1 Ci	41.4 pCi/g	48 pCi/g	81 pCi/g
Thorium-230†	0.01 Ci	42.8 pCi/g	4830 pCi/g	8050 pCi/g
Thorium-232 ^b	0.001 Ci	41.4 pCi/g	48 pCi/g	81 pCi/g
Lead	10.0 lb	294 mg/kg	220 mg/kg	370 mg/kg
Arsenic	1.0 lb	260 mg/kg	22 mg/kg	37 mg/kg

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

^a These values have been estimated using analytical results of samples collected during the RI. Only data points within the expected areas of removal and from material staged in Dickson Warehouse were included.

^b The method to determine the RQs for mixtures or solutions of radionuclides can be found in paragraph 7 of the note preceding TABLE 1 of 49 CFR 172.101 Appendix A. RQs for the following radionuclide mixtures are provided: radium-226 in secular equilibrium with its daughters (0.053 curie); and natural thorium in secular equilibrium with its daughters (0.011 curie).

† Average and maximum concentrations for radium-228 and thorium-230 are estimated values and assumes secular equilibrium with its respective decay chain.

The two types of containers currently planned for the site are 28 cy intermodal boxes and 12 cy tandem dump trucks. Over the road weight restrictions will require ECC to limit the loads to approximate 15 cy and 9 cy respectively. Assuming a soil density of 1.52 ton / cy, the loads are estimated to weigh 45,600 lbs and 27,360 lbs, respectively. The Arsenic concentrations that would result in exceeding the RQ, are 22 mg/kg for intermodals and 37 mg/kg for tandem dump trucks. Considering the average concentration of arsenic, based on the FRD, is 260 mg/kg and the remedial goal is 24 mg/kg, all shipments will likely carry reportable quantities of arsenic.

Using the same assumptions, some shipments also are expected to exceed the RQ for lead and possibly Thorium-232. No shipments are expected to exceed the RQ for Radium-226. The assignment of RQ designations for each shipment will be confirmed at the time of loading.

5.2 Shipping Paperwork, Labels, and Markings

ECC will use a bill of lading for the material and ship the material under the DOT Proper Shipping Name:

Class 7 Shipments – Radioactive Material, LSA, nos, UN2912 (RQ Radionuclides)

Class 9 Shipments - Environmentally Hazardous Substances, solid, nos, 9, UN3082, PGIII (RQ Arsenic)

The use of Uniform Low Level Radioactive Waste Manifests is not expected. If a NRC licensed facility is chosen as a disposal site, ECC shall utilize the paperwork required by the facility. Class 9 shipments do not require labels, markings, or placarding.

5.3 Equipment and Vehicle Maintenance

ECC will always operate and maintain onsite vehicles and equipment in good working order. All operators and drivers will be responsible for daily inspection of each vehicle and piece of equipment on the site. The foreman will tag out vehicles and/or equipment that fail inspection. After repairs have been made, the vehicle and/or equipment will be re-inspected, and approved by the SSHO.

Minor maintenance items will be repaired at the site. These items include belts, hoses, filters, nuts, bolts, washers, bulbs, wipers, window glass, fluids, plugs, wires, etc. If possible, work will be performed during off-duty hours to minimize vehicle/equipment

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

down time. Tagged out vehicles and equipment will be worked on immediately to return the item to service.

ECC anticipates most repairs will be performed onsite. However, some repairs may have to be performed offsite. In order to determine whether a repair should be performed offsite, ECC will evaluate each repair on a case by case basis. If a vehicle or piece of equipment must leave the site, it will be thoroughly decontaminated, surveyed, and inspected prior to leaving the site.

Physical integrity inspections also will be performed for intermodal containers. Prior to use, intermodal containers will be visually inspected for general condition, and lined with a form-fitting sealed layer of polyethylene. After being loaded, each container will be closed. During the loading process the liner position will be monitored to ensure that it remains high in the container so the conveyance is siftproof, as defined by 49 CFR 173.240(c). After being loaded, the conveyance will be visually inspected to ensure it is secured, covers the load completely, and is in acceptable condition.

5.4 Shipment Notifications

If an advance notification is required, the appropriate (e.g., five day) advanced notification will be completed and forwarded to the disposal facility. ECC also will notify the appropriate receiving state authority if required.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

6.0 SITE REGRADING

ECC will re-grade all excavations to remove dropoffs and allow storm water run-off to flow naturally to outfalls and storm drains. Pooling conditions will be minimized and perimeter silt fence will remain. ECC will remove all temporary facilities. ECC does not plan to import any offsite backfill, other than a sufficient layer of organic topsoil to support necessary seeding in excavation areas.

Seeding will be completed on the affected property as determined necessary with a area specific seeding mixture. Seeding should be used, if determined necessary, to provide stabilization of compacted soils and slopes.

*Final Remedial Action Work Plan
Li Tungsten Superfund Site
Glen Cove, New York*

7.0 REFERENCES

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